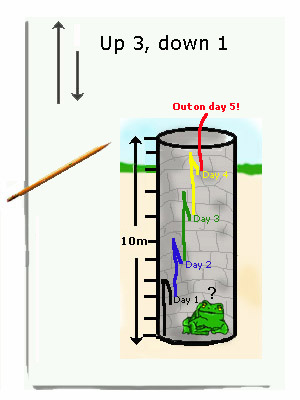
**Problem Solving: Draw a Picture**

**What Is It?**

The draw a picture strategy is a problem-solving technique in which students make a visual representation of the problem. For example, the following problem could be solved by drawing a picture:

A frog is at the bottom of a 10-meter well. Each day he climbs up 3 meters. Each night he slides down 1 meter. On what day will he reach the top of the well and escape?



**Why Is It Important?**

Drawing a diagram or other type of visual representation is often a good starting point for solving all kinds of [word problems](http://www.teachervision.fen.com/word-problems/teacher-resources/34516.html). It is an intermediate step between language-as-text and the symbolic language of mathematics. By representing units of measurement and other objects visually, students can begin to think about the problem [mathematically](http://www.teachervision.fen.com/tv/subjects/170000000000). Pictures and diagrams are also good ways of describing solutions to problems; therefore they are an important part of mathematical communication.

**How Can You Make It Happen?**

Encourage students to draw pictures of problems at the very beginning of their mathematical education. Promote and reinforce the strategy at all subsequent stages. Most students will naturally draw pictures if given the slightest encouragement.

Introduce a problem to students that will require them to draw a picture to solve. For example:

Marah is putting up a tent for a family reunion. The tent is 16 feet by 5 feet. Each 4-foot section of tent needs a post except the sides that are 5 feet. How many posts will she need?

Demonstrate that the first step to solving the problem is understanding it. This involves finding the key pieces of information needed to figure out the answer. This may require students reading the problem several times or putting the problem into their own words.

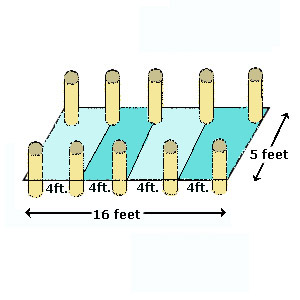
16 feet by 5 feet  
1 post every 4 feet, including 1 at each corner  
No posts on the short sides

1. **Choose a Strategy**

Most often, students use the draw a picture strategy to solve problems involving space or organization, but it can be applied to almost all math problems. Also students use this strategy when working with new concepts such as equivalent fractions or the basic operations of multiplication and division.

1. **Solve the Problem**

Students understand that there are posts every 4 feet. In the second sample problem, students are asked to organize data spatially to determine the number of posts Marah will need. They can draw a picture or a diagram to find the answer.



I drew a rectangle where each long side is 16 feet, and there is 1 post every 4 feet. I drew a circle for each post. I remembered to draw a post at each end. There are 10 posts total.

1. **Check Your Answer**

Ask students to read the problem again to be sure they answered the question.

I found that there are 10 posts.

Students should check their math to be sure it is correct.

16 divided by 4 is 4. There are 4 sections of 4 feet on each long side.  
There is a post on each end, so 4 + 1 = 5. There are 2 sides to the tent, and 5 x 2 = 10.

Discuss with students whether draw a picture was the best strategy for this problem. Was there a better way to solve it?

Drawing a picture was a good strategy to use for this problem because students might forget to count the posts on each corner unless they see them.

1. **Explain How You Found the Answer**

Students should explain their answer and the process they went through to solve the problem. It is important for students to talk or write about their thinking. There may be more than one way to represent a problem visually, and asking students to explain their picture helps to understand their thinking process and identify errors.

My answer is 10 fence posts. First, I tried to solve this by multiplying. I took 16 and divided by 4 to find the number of posts on each side. I got 4 posts on each side. Then I doubled it to get 8 posts total. I checked the problem and realized that there are posts on each corner, so I drew a picture so that I could see it and be sure the answer was correct.

I drew a rectangle to show the tent. Each long side is 16 feet, and there is 1 post every 4 feet, so I divided 16 by 4 to find out that there are 4 sections of 4 feet each. I drew a circle for each post, and wrote the number in the space between each post. I remembered to draw a post at each end. I counted the posts and found out that there are 10 posts total.

1. **Guided Practice**

Have students try to solve the following problem using the draw a picture strategy.

Tai wants to frame a 3 x 5 picture surrounded by 2 inches of mat. How large will her frame need to be?

Have students work in pairs, groups, or individually to solve this problem. They should be able to tell or write about how they found the answer as well as be able to justify their reasoning.

**How Can You Stretch Students' Thinking?**

Some students are visual learners and work well when problems are illustrated or easy to see. Encourage students to draw pictures or diagrams for problems they find difficult. Encourage students to label all parts of their drawings. Students should understand that their drawings do not need to be perfect. Rather, their drawings need only represent the problem accurately and clearly show their thought processes.

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